What is claimed is:

1. A hard magnetic film structural body, comprising:

a substrate having a main surface;

a crystal metal base film formed on the main surface of said substrate;

an amorphous layer formed between said substrate and said crystal metal base film; and

a hard magnetic film formed on said crystal metal base film and containing Co as a structural element, said hard magnetic film having a bi-crystal structure.

2. The hard magnetic film structural body as set forth in claim 1,

wherein said amorphous layer is a reactive layer of the substrate and the crystal metal base film.

3. The hard magnetic film structural body as set forth in claim 1,

farther comprising a reactive metal crystal layer disposed between the crystal metal base film and the amorphous layer.

4. The hard magnetic film structural body as set forth in claim 1,

wherein said substrate has a surface layer on the main surface side, the surface layer being composed of at least one selected from the group consisting of an oxide, a nitride, and a carbide.

5. The hard magnetic film structural body as set forth in claim 1,

wherein said hard magnetic film containing Co as a

structural element has Co(110) oriented perpendicular to the surface thereof.

6. The hard magnetic film structural body as set forth in claim 1,

wherein said crystal metal base film contains at least one element selected from the group consisting of Cr, V, Ti, Ta, W, Zr, Nb, Hf, Mo, and Al.

7. The hard magnetic film structural body as set forth in claim 1,

wherein said crystal metal base film has a bcc (200) orientation component.

8. The hard magnetic film structural body as set forth in claim 1,

wherein the total film thickness of said crystal metal base film and said amorphous layer is 50 nm or less.

9. The hard magnetic film structural body as set forth in claim 1,

wherein the average diameter of crystal grains of said crystal metal base film is five times or more the thickness thereof.

10. The hard magnetic film structural body as set forth in claim 1,

wherein said hard magnetic film has main-grains and sub-grains, the diameter of the main-grain being 50 nm or more, each of the main-grains having the sub-grains.

11. The hard magnetic film structural body as set forth in claim 1,

wherein said crystal metal base film and said amorphous

layer are magnetic layers.

12. A hard magnetic film structural body, comprising:

a substrate having a main surface;

a crystal metal base film formed on the main surface of said substrate;

a mixing layer formed between said substrate and said crystal metal base film and containing structural elements of said substrate and structural elements of said crystal metal base film; and

a hard magnetic film formed on said crystal metal base film and containing Co as a structural element, said hard magnetic film having a bi-crystal structure.

13. The hard magnetic film structural body as set forth in claim 12,

wherein said substrate has a surface layer on the main surface side, the surface layer being composed of at least one selected from the group consisting of an oxide, a nitride, and a carbide.

14. The hard magnetic film structural body as set forth in claim 12,

wherein said hard magnetic film containing Co as a structural element has Co(110) oriented perpendicular to the surface thereof.

15. The hard magnetic film structural body as set forth in claim 12,

wherein said crystal metal base film contains at least one element selected from the group consisting of Cr, V, Ti, Ta, W, Zr, Nb, Hf, Mo, and Al.

16. The hard magnetic film structural body as set forth in claim 12,

wherein said crystal metal base film has a bcc (200) orientation component.

17. The hard magnetic film structural body as set forth in claim 12,

wherein the total film thickness of said crystal metal base film and said mixing layer is 50 nm or less.

18. The hard magnetic film structural body as set forth in claim 12,

wherein the average diameter of crystal grains of said crystal metal base film is five times or more the thickness thereof.

19. The hard magnetic film structural body as set forth in claim 12,

wherein said hard magnetic film has main-grains and sub-grains, the diameter of the main-grain being 50 nm or more, each of the main-grains having the sub-grains.

20. The hard magnetic film structural body as set forth in claim 12,

wherein said crystal metal base film and said mixing layer are magnetic layers.

21. A magnetoresistance effect device, comprising:

a substrate having a main surface;

a magnetoresistance effect film formed on the main surface of said substrate and having a magnetic field detecting portion;

a pair of bias magnetic field applying films disposed

adjacent to both edge portions of the magnetic field detecting portion, the bias magnetic field applying films having hard magnetic films containing Co as a structural element and having a bi-crystal structure.

22. The magnetoresistance effect device as set forth in claim 21,

wherein said hard magnetic film containing Co as a structural element has Co(110) oriented perpendicular to the surface thereof.

23. The magnetoresistance effect device as set forth in claim 21,

wherein said hard magnetic film is composed of CoPt or CoCrPt.

24. The magnetoreisistance effect device as set forth in claim 21,

further comprising a metal crystal layer as a base film of the hard magnetic film, said metal crystal layer containing at least one selected from Cr and V.

25. The magnetoresistance effect device as set forth in claim 21,

wherein said magnetoresistance effect film is formed so that at least both edge portions thereof are layered on said pair of bias magnetic field applying films, said magnetoresistance effect film exchange-coupling said bias magnetic field applying films.

26. The magnetoresistance effect device as set forth in claim 21,

wherein said pair of bias magnetic field applying films

are abutted against said magnetoresistance effect film.

27. A magnetoresistance effect device, comprising:

a substrate having a insulating layer as a surface layer;

a magnetoresistance effect film formed on the insulating layer of said substrate and having a magnetic field detecting portion;

a pair of bias magnetic field ~~effect~~ applying films disposed adjacent to both edge portions of the magnetic field detecting portion and having an amorphous layer, a metal crystal layer, and a hard magnetic film containing Co as a structural element successively layered on the insulating layer of said substrate; and

a pair of electrodes for supplying a current to said magnetoresistance effect film.

28. A magnetoresistance effect device as set forth in claim 27,

wherein said amorphous layer contains structural elements of said insulating layer of the substrate and structural elements of said metal crystal layer.

29. The magnetoresistance effect device as set forth in claim 28,

wherein said amorphous layer is a reactive layer of the insulating layer and the metal crystal layer.

30. The magnetoresistance effect device as set forth in claim 27,

wherein the metal crystal layer has a crystal metal base film, and a reactive crystal layer.

31. The magnetoresistance effect device as set forth in

claim 27,

wherein said metal crystal layer contains at least one selected from Cr and V.

32. The magnetoresistance effect device as set forth in claim 20,

wherein said insulating layer is composed of at least one selected from the group consisting of an oxide, a metal nitride, and a carbide.

33. The magnetoresistance effect device as set forth in claim 27,

wherein said metal crystal layer contains at least one selected from Cr and V.

34. The magnetoresistance effect device as set forth in claim 33,

wherein said hard magnetic film containing Co as a structural element has Co(110) oriented perpendicular to the surface thereof.

35. The magnetoresistance effect device as set forth in claim 27,

wherein said hard magnetic film is composed of CoPt or CoCrPt.

36. The magnetoresistance effect device as set forth in claim 27,

wherein said magnetoresistance effect film is formed so that at least both edge portions thereof are layered on said pair of bias magnetic field applying films, said magnetoresistance effect film exchange-coupling said bias magnetic field applying films.

37. The magnetoresistance effect device as set forth in claim 27,

wherein said pair of bias magnetic field applying films are abutted against said magnetoresistance effect film.

38. A magnetoresistance effect device, comprising:

a substrate having a main surface;

a magnetoresistance effect film formed on the main surface of said substrate and having a magnetic field detecting portion;

a pair of bias magnetic field ~~effect~~ applying films disposed adjacent to both edge portions of the magnetic field detecting portion and having a crystal metal base film on the main surface of the substrate, a mixing layer formed between the substrate and the crystal metal base film and containing structural elements of the substrate and structural elements of said crystal metal base film, and a hard magnetic film formed on the crystal metal base film and containing Co as a structural element; and

a pair of electrodes for supplying a current to said magnetoresistance effect film.

39. A magnetoresistance effect device as set forth in claim 38,

wherein said mixing layer is an amorphous layer.

40. The magnetoresistance effect device as set forth in claim 38,

wherein said crystal metal base film contains at least one selected from Cr and V.

41. The magnetoresistance effect device as set forth in

claim 38,

wherein said substrate has a surface layer disposed on the main surface side, the surface layer being composed of at least one selected from the group consisting of an oxide, a nitride, and a carbide.

42. The magnetoresistance effect device as set forth in claim 38,

wherein said hard magnetic film containing Co as a structural element has a bi-crystal structure.

43. The magnetoresistance effect device as set forth in claim 42,

wherein said hard magnetic film containing Co as a structural element has Co(110) oriented perpendicular to the surface thereof.

44. The magnetoresistance effect device as set forth in claim 38,

wherein said hard magnetic film is composed of CoPt or CoCrPt.

45. The magnetoresistance effect device as set forth in claim 38,

wherein said magnetoresistance effect film is formed so that at least both edge portions thereof are layered on said pair of bias magnetic field applying films, said magnetoresistance effect film exchange-coupling said bias magnetic field applying films.

46. The magnetoresistance effect device as set forth in claim 38,

wherein said pair of bias magnetic field applying films

are abutted against said magnetoresistance effect film.

47. A magnetic head, comprising:

a lower magnetic shield layer;

a magnetoresistance effect device formed on said lower magnetic shield layer through a lower reproduction magnetic gap, said magnetoresistance effect device being as set forth in claim 21, 27, or 38; and

an upper magnetic shield layer formed on said magnetoresistance effect device through an upper reproduction magnetic gap.

48. A magnetic recording/reproducing head, comprising:

a reproducing head having a magnetic head as set forth in claim 47;

a recording head having a lower magnetic pole in common with said lower magnetic shield layer of said magnetic head, a record magnetic gap formed on the lower magnetic pole, an upper magnetic pole formed on the record magnetic gap, and a record coil for supplying a record magnetic field to the lower magnetic pole and the upper magnetic pole.

49. A magnetic record medium, comprising:

a substrate having a main surface;

a base film having an amorphous layer and a metal crystal layer successively layered above the main surface of said substrate;

a record layer formed on said base film and composed of a hard magnetic film containing Co as a structural element, the hard magnetic film having a bi-crystal structure; and

a protection film formed on said record layer.

50. The magnetic record medium as set forth in claim 49, wherein said hard magnetic film containing Co as a structural element has co(110) oriented perpendicular to the surface thereof.

51. A magnetic record medium as set forth in claim 49, wherein said amorphous layer contains structural elements of said substrate and structural elements of said metal crystal layer.

52. The magnetic record medium as set forth in claim 51, wherein said amorphous layer is a reactive layer of the substrate and the metal crystal layer.

53. The magnetic record medium as set forth in claim 49, wherein said metal crystal layer has a crystal metal base film, and a reactive crystal layer.

54. The magnetic record medium as set forth in claim 49, wherein said substrate has a surface layer disposed on the main surface side, the surface layer being composed of at least one selected from the group consisting of an oxide, a nitride, and a carbide.

55. A magnetic record medium, comprising:

a substrate having a main surface;

a base film having a metal crystal layer formed on the main surface of said substrate, and a mixing layer between said substrate and said metal crystal layer and containing structural elements of the substrate and structural elements of the metal crystal layer;

a record layer formed on said base film and composed of a hard magnetic film containing Co as a structural element, the

hard magnetic film having a bi-crystal structure; and

a protection film formed on said record layer.

56. The magnetic record medium as set forth in claim 55, wherein said hard magnetic film containing Co as a structural element has Co(110) oriented perpendicular to the surface thereof.

57. The magnetic record medium as set forth in claim 55, wherein said substrate has a surface layer disposed on the main surface side, the surface layer being composed of at least one selected from the group consisting of an oxide, a nitride, and a carbide.

58. A magnetic storing apparatus, comprising:

the magentoresistance effect device of claim 21, 27, or 38;

a write electrode for storing information to the magnetoresistance effect film of the magnetoresisitance effect device; and

a read electrode, composed of the electrode of the magentoresistance effect device, for reproducing information stored in the magnetoresistance effect film.

Add A24